

What is claim d is:

1. A gamma voltage generator for generating a plurality of individually tunable gamma voltages corresponding to a symmetric gamma curve, the generator comprising:

a plurality of adjustable voltage sources for providing an adjustable common voltage and a plurality of adjustable voltages to further derive a common gamma voltage and a plurality of first gamma voltages therefrom; and

a mirror mapping circuit for mapping each of the plurality of first gamma voltages with the common gamma voltage as a reference to thereby generate a plurality of mapped voltages to further derive a plurality of second gamma voltages therefrom with the common gamma voltage as a center axis for the plurality of first and second gamma voltages distributed substantially symmetric to each other;

wherein the common gamma voltage and the plurality of first and second gamma voltages are provided for the gamma voltages corresponding to the gamma curve.

2. The gamma voltage generator of claim 1, wherein each of the plurality of adjustable voltage sources comprising:

an adjustable resistive element; and

a gamma current flowing through the adjustable resistive element for generating one of the adjustable common voltage and the plurality of adjustable voltages.

5 3. The gamma voltage generator of claim 2, further comprising a current mirror for mirroring a reference current to thereby generate the gamma current.

10 4. The gamma voltage generator of claim 3, further comprising an adjustable current source for providing the reference current.

15 5. The gamma voltage generator of claim 4, wherein the adjustable current source comprises a second adjustable resistive element connected with a reference voltage for generating the reference current.

20 6. The gamma voltage generator of claim 4, wherein the adjustable current source comprises a reference resistor connected with an adjustable reference voltage for generating the reference current.

25 7. The gamma voltage generator of claim 1, wherein the mirror mapping circuit comprises a plurality of operational amplifiers each subtracting one of the plurality of first gamma voltages from

double of the common gamma voltage to thereby generate corresponding one of the plurality of mapped voltages.

5 8. The gamma voltage generator of claim 1, wherein the mirror mapping circuit comprises a plurality of voltage converter each including:

10 a first current mirror having a first reference branch connected with the common gamma voltage and a first resistive element for generating a first current, and a first mirror branch for mirroring the first current to thereby generate a second current in a first ratio to the first current;

15 a second current mirror having a second reference branch connected with one of the plurality of first gamma voltages and a second resistive element for generating a third current, and a second mirror branch for mirroring the third current to thereby generate a fourth current in a second ratio to the third current; and

20 a third resistive element connected with the second and fourth currents for generating corresponding one of the mapped voltages proportional to a difference between the second and fourth currents.

25 9. The gamma voltage generator of claim 8, wherein the

first, second and third resistive elements comprise a substantially same resistance.

10. A method for generating a plurality of individually tunable gamma voltages corresponding to a symmetric gamma curve, the method comprising the steps of:

generating an adjustable common voltage and a plurality of adjustable voltages;

deriving a common gamma voltage and a plurality of first gamma voltages from the adjustable common voltage and the plurality of adjustable voltages, respectively;

mapping each of the plurality of first gamma voltages with the common gamma voltage as a reference to thereby generate a plurality of mapped voltages; and

deriving a plurality of second gamma voltages from the plurality of mapped voltages with the common gamma voltage as a center axis for the plurality of first and second gamma voltages distributed substantially symmetric to each other;

wherein the common gamma voltage and the plurality of first and second gamma voltages are provided for the gamma voltages corresponding to the gamma curve.

11. The method of claim 10, wherein the step of generating an adjustable common voltage and a plurality of adjustable voltages

comprises the steps of:

generating a plurality of gamma currents of a substantially
same magnitude; and

5 generating the adjustable common voltage and the
plurality of adjustable voltages each by a respective
one of the plurality of gamma currents flowing
through an adjustable resistive element.

12. The method of claim 11, further comprising the step of
10 mirroring a reference current to thereby generate the plurality of
gamma currents.

13. The method of claim 12, further comprising the step of
applying a reference voltage to a second adjustable resistive element
15 for generating the reference current.

14. The method of claim 12, further comprising the step of
applying an adjustable reference voltage to a reference resistor for
generating the reference current.

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15. The method of claim 10, wherein the step of generating
a plurality of mapped voltages comprises the steps of:

subtracting one of the plurality of first gamma voltages
from the common gamma voltage to thereby generate
25 a difference; and

summing the difference and the common gamma voltage to
thereby generate a corresponding mapped voltage.

5 16. The method of claim 10, wherein the step of generating
a plurality of mapped voltages comprises the steps of:
generating a first current from the common gamma
voltage;
generating a second current in a first ratio to the first
current;
10 generating a third current from one of the plurality of first
gamma voltages;
generating a fourth current in a second ratio to the third
current; and
generating a corresponding mapped voltage from a
15 difference between the second and fourth currents.

17. The method of claim 16, further comprising the steps
of:
generating a first voltage from the second current with the
20 first voltage in the first ratio to the common gamma
voltage;
generating a second voltage from the fourth current with
the second voltage in the second ratio to the one of
the plurality of first gamma voltages; and
25 subtracting the second voltage from the first voltage to

generate the corresponding mapped voltage.

18. A gamma voltage generator for generating a plurality of individually tunable gamma voltages corresponding to a symmetric gamma curve, the generator comprising:

a current source for providing a reference current;

a current mirror for mirroring the reference current to generate a plurality of gamma currents; and

means for generating a common gamma voltage and a plurality of first and second gamma voltages proportional to the plurality of gamma currents with the common gamma voltage as a center axis for the plurality of first and second gamma voltages distributed substantially symmetric to each other;

wherein the common gamma voltage and the plurality of first and second gamma voltages are provided for the gamma voltages corresponding to the gamma curve.

19. The gamma voltage generator of claim 18, wherein the plurality of gamma currents have a substantially same magnitude.

20. The gamma voltage generator of claim 18, wherein the means for generating a common gamma voltage and a plurality of first and second gamma voltages comprises means for mapping the plurality of first gamma voltages to generate the plurality of second

gamma voltages with the common gamma voltage as a center axis.

21. The gamma voltage generator of claim 18, wherein the current source comprises an adjustable resistive element connected with a reference voltage for generating the reference current.

22. The gamma voltage generator of claim 18, wherein the current source comprises a resistive element connected with an adjustable reference voltage for generating the reference current.

23. The gamma voltage generator of claim 18, wherein the means for generating a common gamma voltage and a plurality of first and second gamma voltages comprises means for transforming the plurality of gamma currents to the common gamma voltage and the plurality of first and second gamma voltages.

24. The gamma voltage generator of claim 20, wherein the means for mapping the plurality of first gamma voltages to generate the plurality of second gamma voltages comprises:

means for subtracting one of the plurality of first gamma voltages from the common gamma voltage to thereby generate a difference; and

means for summing the difference and the common gamma voltage to thereby generate a corresponding second gamma voltage.

25. The gamma voltage generator of claim 20, wherein the means for mapping the plurality of first gamma voltages to generate the plurality of second gamma voltages comprises:

5 means for generating a first current in a first ratio to the
 common gamma voltage;
 means for generating a second current in a first ratio to
 one of the plurality of first gamma voltages; and
 means for generating a corresponding second gamma
10 voltage in a third ratio to a difference between the
 first and second currents.

26. A method for generating a plurality of individually tunable gamma voltages corresponding to a symmetric gamma curve,
15 the method comprising the steps of:

 providing a reference current;
 mirroring the reference current for generating a plurality of
 gamma currents; and
 generating a common gamma voltage and a plurality of
20 first and second gamma voltages proportional to the
 plurality of gamma currents with the common gamma
 voltage as a center axis for the plurality of first and
 second gamma voltages distributed substantially
 symmetric to each other;
25 wherein the common gamma voltage and the plurality of

first and second gamma voltages are provided for the gamma voltages corresponding to the gamma curve.

27. The method of claim 26, further comprising the step of
5 mapping the plurality of first gamma voltages to generate the plurality of second gamma voltages with the common gamma voltage as a center axis.

28. The method of claim 26, further comprising the step of
10 applying the plurality of gamma currents each flowing through an adjustable resistive element to generate the common gamma voltage, one of the plurality of first gamma voltages, or one of the plurality of second gamma voltages.

29. The method of claim 26, further comprising the step of
15 applying a reference voltage to an adjustable resistive element for generating the reference current.

30. The method of claim 26, further comprising the step of
20 applying an adjustable reference voltage to a reference resistor for generating the reference current.

31. The method of claim 27, wherein the step of generating the plurality of second gamma voltages comprises the steps of:
25 subtracting one of the plurality of first gamma voltages

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from the common gamma voltage to thereby generate
a difference; and
summing the difference and the common gamma voltage to
thereby generate a corresponding second gamma
voltage.

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32. The method of claim 27, wherein the step of generating
the plurality of second gamma voltages comprises the steps of:

generating a first current from the common gamma
voltage;
generating a second current in a first ratio to the first
current;
generating a third current from one of the plurality of first
gamma voltages;
generating a fourth current in a second ratio to the third
current; and
generating a corresponding second gamma voltage from a
difference between the second and fourth currents.

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33. The method of claim 32, further comprising the steps
of:

generating a first voltage from the second current with the
first voltage in the first ratio to the common gamma
voltage;
generating a second voltage from the fourth current with

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the second voltage in the second ratio to the one of
the plurality of first gamma voltages; and
subtracting the second voltage from the first voltage to
generate the corresponding mapped voltage.

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